



# **California DG Policy, Research, Commercialization and Beyond: The Search for Clear Direction**



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**California Energy Commission**  
**November 7, 2003**



## Topics for Today's Discussion

- DG Policy Plans
- DG Regulations and Decisions
- Commercialization Activities
- Research Activities
- Appendix



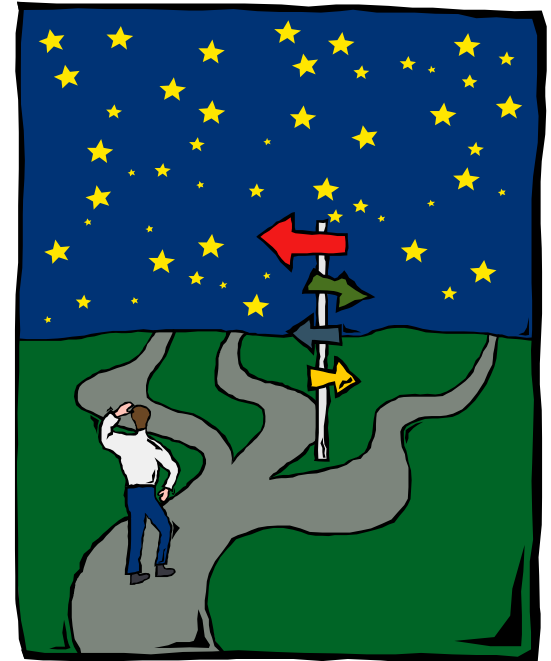
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# California Actually Has a DG Strategic Plan



- Energy Commission adopted DG Strategic Plan in June 2002.
- Plan's Vision: DG will be an integral part of California's energy system...provided it makes sense to do so.
- However, prospects for effective DG deployment depend upon removing regulatory, institutional, and business-related barriers.



Agency Collaboration is Essential to the Future Success of the Plan!!!!

# DG is Part of the “Energy Action Plan”



**CONSUMER POWER AND  
CONSERVATION  
FINANCING AUTHORITY**



**CALIFORNIA  
ENERGY COMMISSION**



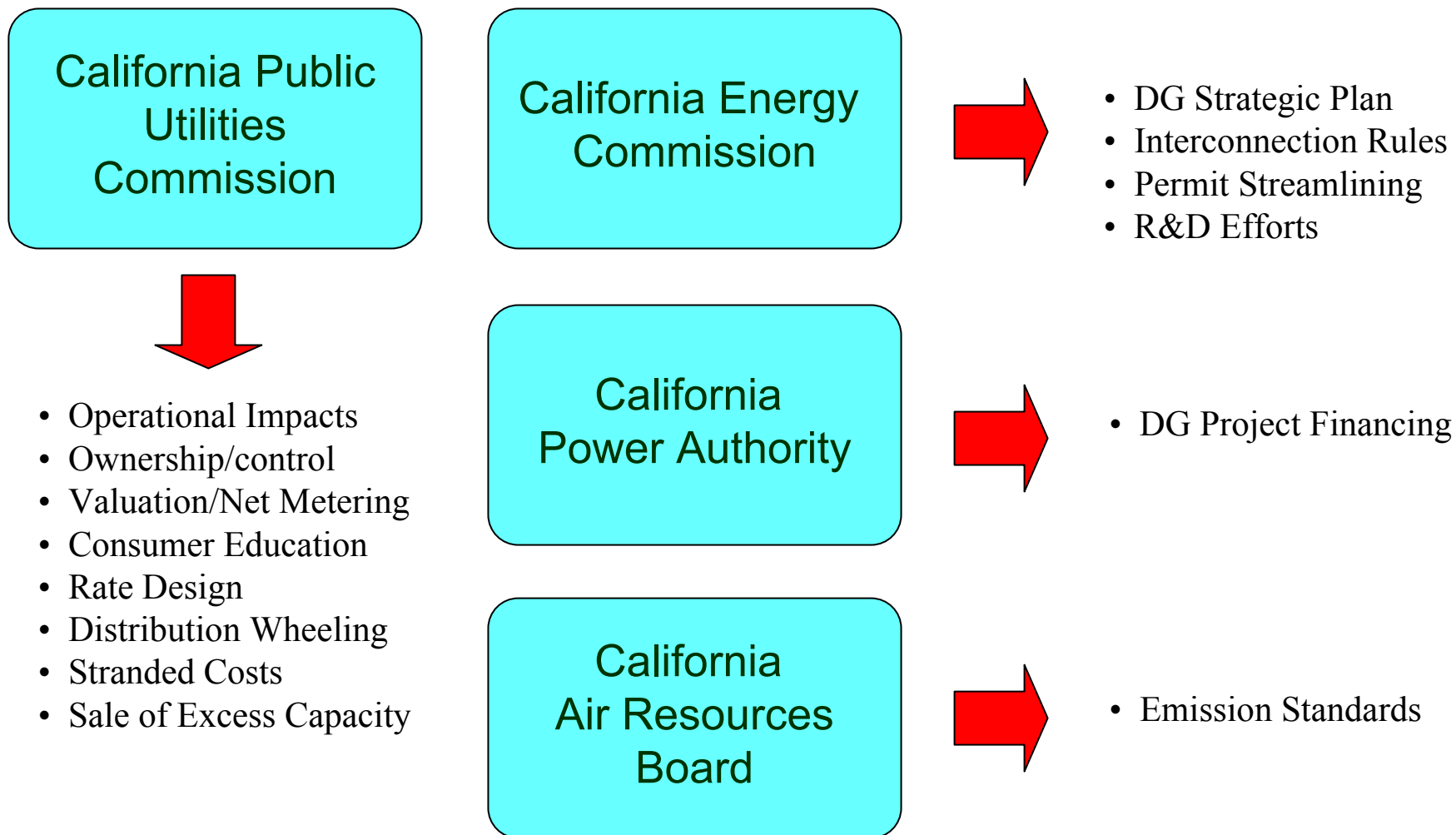
**PUBLIC UTILITIES  
COMMISSION**

## **Action Item 6: Promote Customer and Utility-owned Distributed Generation.**

The agencies will work together to further develop distributed generation policies, target research and development, track the market adoption of distributed generation technologies, identify cumulative energy system impacts and examine issues associated with new technologies and their use.



# Other Goal of Plan: Coordinate DG Activities Across State Agencies



# So Where Do We Go Now?



DG Policy direction is fine but the state needs a focused energy policy.

# The Answer: The CEC's Energy Report



A Committee Draft report which applies the basic “loading” order strategy advocated in the Energy Action Plan.”

- 1) Harvest Energy Efficiency
- 2) Diversify Fuel Types
- 3) Encourage Customer Alternatives
- 4) Improve Infrastructure





# Energy Report's Principal Recommendations



- Increase public funding for energy efficiency programs above current levels to achieve and additional 1700 MW of electricity by 2008.
- Enact legislation that accelerates RPS to 20 percent by 2010.
- Explore a retail market structure that promotes customer choice.
- Consolidate transmission permitting process at the Energy Commission
- Establish one-stop permitting process for petroleum infrastructure.



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# But There Are Still Lots of Barriers to Effective DG Deployment



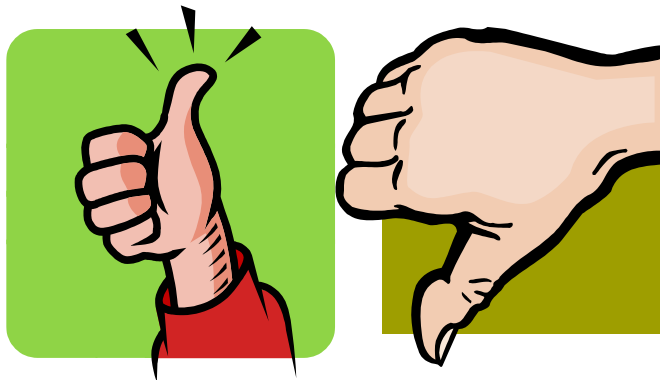
- Lack of standardized interconnection rules statewide.
- Standby charges.
- Stranded assets and exit fees.
- Air quality rules and misuse of emissions standards.
- Siting regulations.
- Financial barriers.



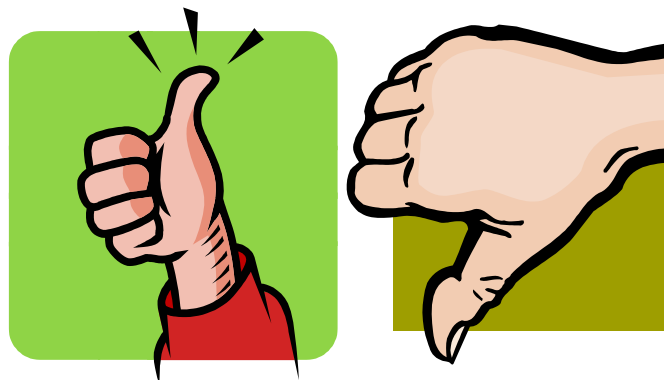
# DG Policy Decisions Have Had Mixed Results



Surcharges



Incentives



Interconnection



Utility Procurement



Net Metering



### AB1685 – Self Gen Program

Extends self-generation program and tightens emissions requirements.

Modifies definition of Ultra Clean and Low Emissions.

### AB428 – Core/Noncore

Encourages retention of existing cogeneration and developing new cogeneration resources. Noncore tariffs to be established.

Failed Senate Energy Committee but granted reconsideration.





# Departing Load Exit Fees And Exemptions

## MAJOR SURCHARGE CATEGORIES



SCE Historical  
Procurement Charges  
6/00 - 1/17/01 Costs

DWR Bond Charges  
1/17/01 - 12/31/02  
Costs

DWR LT Contracts  
Charges  
2003 - ??? Costs

## ACTUAL FEE



0 cents/kWh for  
new customers

0.5 cents/kWh

2.7 cents/kWh???  
Equal to Direct  
Access Surcharge

## CUSTOMER EXEMPTIONS

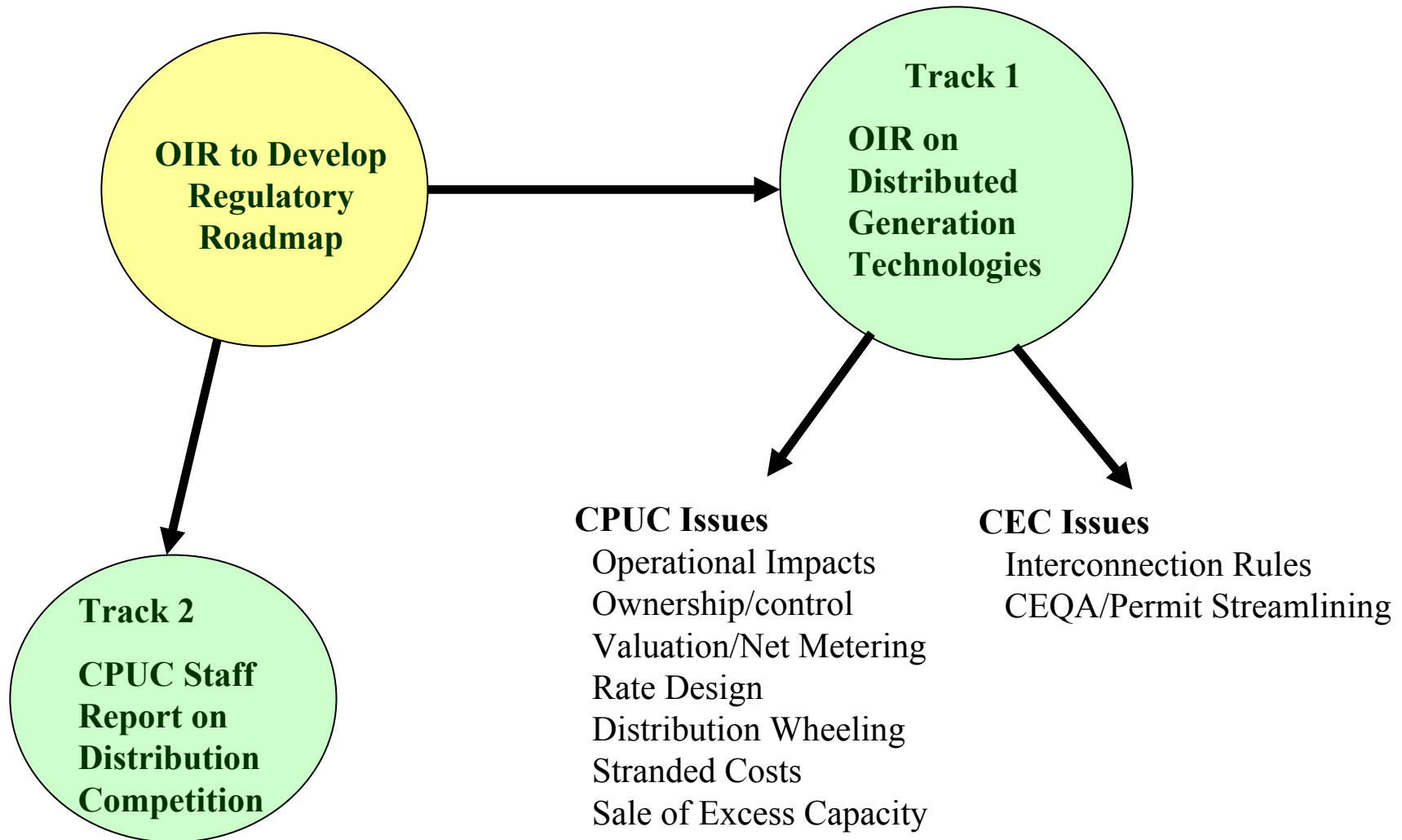
### Complete Exemption

- Net Metering customers below 1 MW.
- Biogas customers eligible under AB2228.
- Departing load Under 1 MW that is eligible for financial incentives from the CEC or CPUC.
- Departing load receiving service on or before 2/1/01.

### Exemption from DWR LT Contracts

- Departing load Above 1 MW but defined as “ultra-clean and low emissions” (No HPC payment either)
- 3000 MW of customer generation as determined by the CEC.
- Limit of 1500 MW to generation not classified as “ultra-clean and low emissions”

# Scope of Work Surrounding R.99-10-025





## Summary of Decision

- ★ • No restrictions on ownership of DG units.
- ★ • DG owner can be compensated for deferring distribution system upgrades, but only in limited circumstances.
- No rate design changes needed at this time to accommodate DG.
- No need to adopt a distribution-only tariff.
- Education effort will be “multi-pronged” and rely heavily on the Energy Commission.





# Operational Impacts



- CPUC finds that DG has potential system planning benefits but should be treated just as just another system planning option.
- When distribution-system upgrades are needed, utilities shall determine if a grid-side DG unit is a reasonable solution.
  - Utilities can procure DG at that point.
  - Compensation provided to DG provider only if the cost is less than the alternative distribution upgrade cost.



## Ownership/Control of DG

- Utility not required to own DG on the grid-side of the meter provided that it has sufficient operational control (physical assurance).
  - Third-party ownership allowed with physical assurances and participation in the utility planning process.
- No control or ownership needed on the customer side of the meter.
  - Utilities and affiliates are free to enter the customer-side DG market.



- CPUC envisions Energy Commission as the central repository for DG information, consistent with our commitment in October 2000.
- CPUC and Energy Commission will develop a DG payback tool, emissions information on DG technologies, and permitting requirement information.
  - Consistent with educational outreach efforts identified in energy Commission DG Strategic Plan adopted June 2002.



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# DG Has Become an Important Piece of the California Energy Picture...



Distributed generation accounts for more than 2000 megawatts in California.

**Reliability**  
**Power Quality**



# DG Interconnection Applications Under Rule 21



- Approximately 510 megawatts in DG load proposed since Rule 21 adopted in December 2000.
- 354 new megawatts approved and/or operational.

Application				
	Pending	MW	Approved	MW
PG&E	104	69.5	63	91.3
SCE	66	68.3	104	194.9
SDG&E	15	19.5	45	68.1
Total	185	157.3	212	354.3

## Renewables Buydown Program (March 1998)

- Incentive apply to PVs, small wind turbines, renewable fuel cells, and solar thermal electric.
- \$255 million allocated to program through 2006.
  - \$80 million remaining for systems < 30 kW

## CPUC Self Generation Incentive Program (July 2001)

- Incentive apply to PVs, wind turbines, and fuel cells, microturbines, internal combustion engines, and small gas turbines.
- Administered by PG&E, SCE, SDG&E, and SoCalGas.
- \$125 million annual allocation through 2007.



# Renewables Program Results to Date



- Energy Commission has funded more than \$165 million in renewable DG.
- 6,000 systems (23 MW) installed to date.
  - 1,424 systems (6 MW) installed in 2003.
- More than 1,400 systems (8 MW) currently in review.





# CPUC Self Generation Incentive Program Results to Date



- Approximately 136 megawatts in DG incentives requested totaling \$176 million thus far with \$304 million still available.
- Significant increase in requests between 2003 and 2001 with majority being for smaller systems.

	Available Incentives (in millions)	Incentives Requested (in millions)	MW
PG&E	\$144	\$101	56
SCE	\$78	\$30	21
SDREO	\$42	\$13	9
SoCal Gas	\$40	\$32	50
Total	\$304	\$176	136



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- Established in California by AB 1890 and SB 90 in 1996-97 and implemented in 1998
- \$62.5 million collected annually from investor-owned electricity utility ratepayers for “public interest” energy research, development and demonstration (RD&D) projects

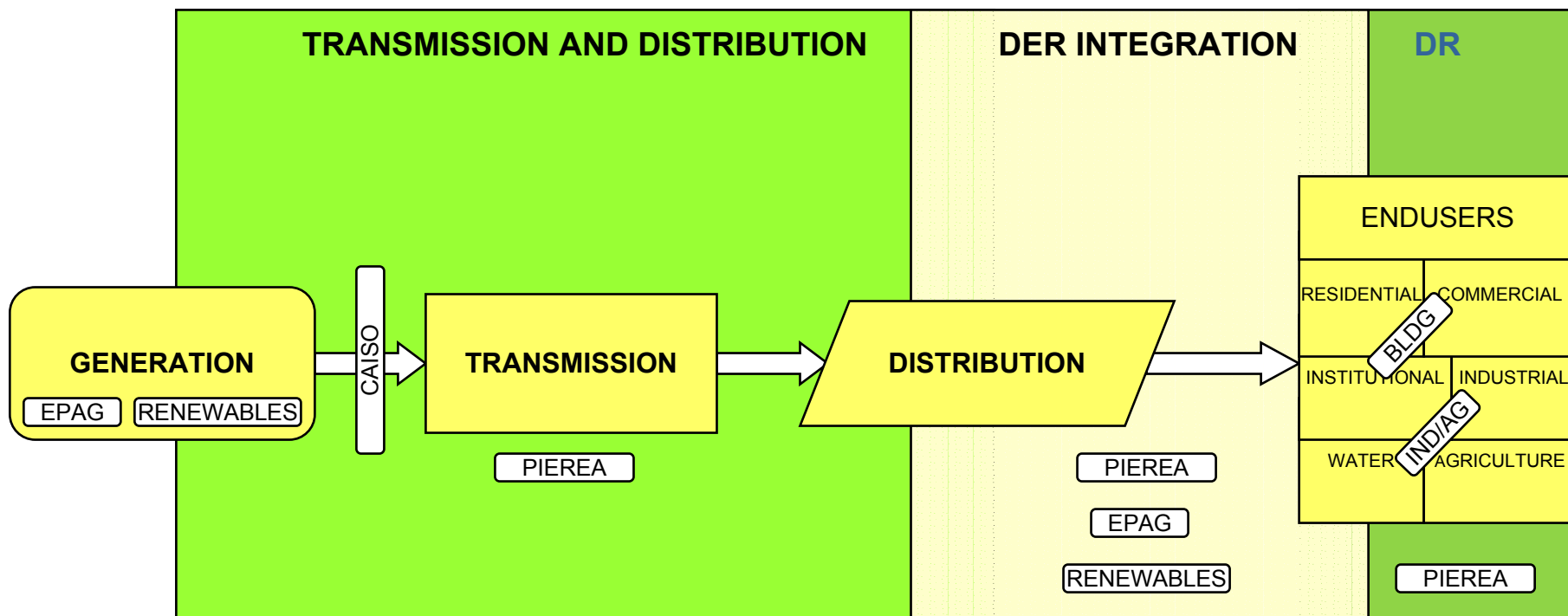


**PIER has 5 primary public benefit energy objectives. Research projects are considered for funding that, if implemented, produce technology, knowledge or procedures that will:**

- Improve energy cost/value
- Improve the environment, public health and safety
- Improve electricity reliability, quality and sufficiency
- Strengthen the California economy
- Provide greater choices for California consumers

# PIER Taxonomy

PIER has a crosscutting portfolio of R&D activities that address all aspects of the electricity enterprise including environmental issues.



DER related R&D constitutes a significant portion of PIER's portfolio.



## PIER DER Portfolio

**93 projects are DER related and total \$81.5M out of over \$266.7M in total PIER-funded R&D.**

- All six PIER program areas have projects that are DER related
  - Environmentally Preferred Advanced Generation (EPAG)
  - Renewables
  - Energy Systems Integration (ESI)
  - Environmental (PIEREA)
  - Buildings
  - Industrial, Agriculture and Water (IAW)
- Research projects address broad spectrum of DER issues



# DER Technology and Policy Issues

Numerous issues were identified as part of Strategic Plan development.

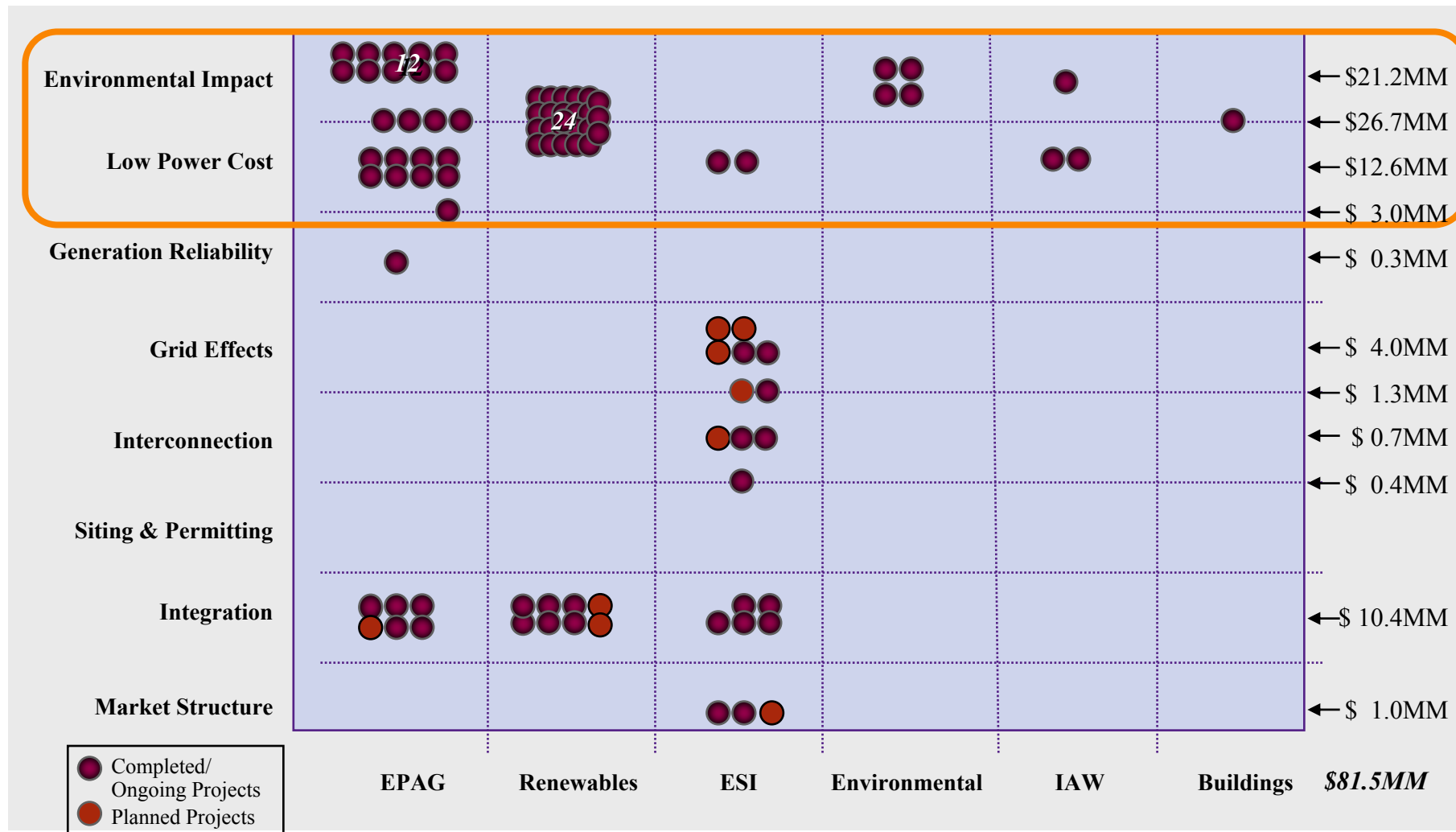
DER Issues	
<b>Environmental Impact</b>	<ul style="list-style-type: none"> <li>• When will DER technologies have a positive impact on the environment?</li> <li>• Should clean DER technologies be subsidized or otherwise encouraged?</li> <li>• Should DER be used to improve air quality?</li> <li>• Should DER improve worker health and safety?</li> </ul>
<b>Low Cost Power</b>	<ul style="list-style-type: none"> <li>• Can DER be competitive with central power generation?</li> <li>• Should customers have the choice of DER to reduce power cost?</li> <li>• Is DER the most economically efficient approach to generating and delivering power to customers?</li> </ul>
<b>Generation Reliability</b>	<ul style="list-style-type: none"> <li>• Will DER improve customer power reliability?</li> <li>• Can customers use DER for high reliability and power quality needs?</li> </ul>
<b>Grid Effects</b>	<ul style="list-style-type: none"> <li>• Will DER improve grid reliability?</li> <li>• Will DER have a positive or negative effect on the power system?</li> <li>• Can grid effects be monetized and allocated to stakeholders?</li> <li>• How can the locational value of DER be exploited?</li> <li>• How can you measure and reward consumers for the grid benefits they generate through use of DER?</li> </ul>
<b>Interconnection</b>	<ul style="list-style-type: none"> <li>• Should technical requirements, processes and contracts be modified for DER?</li> <li>• Can DER be safely and cost effectively interconnected with the power system?</li> <li>• Is plug and play possible for DER interconnection?</li> </ul>
<b>Siting &amp; Permitting</b>	<ul style="list-style-type: none"> <li>• Should siting and permitting requirements be modified for DER?</li> </ul>
<b>Integration</b>	<ul style="list-style-type: none"> <li>• How can DER be integrated with California's current system operations?</li> <li>• How can the system be operated to optimize DER?</li> </ul>
<b>Market Structure</b>	<ul style="list-style-type: none"> <li>• How can DER be integrated with California's current market structure?</li> <li>• Can the market structure be changed to create a win-win for all stakeholders?</li> <li>• How can utilities be incentivized to participate and/or encourage DER?</li> <li>• Can a market structure be created that will allow DER to compete?</li> <li>• Should California use net metering?</li> </ul>

Note: Issue candidates are not listed in any particular order



# PIER DER Portfolio

76% of portfolio focused on reducing environmental impact and developing lower cost power.

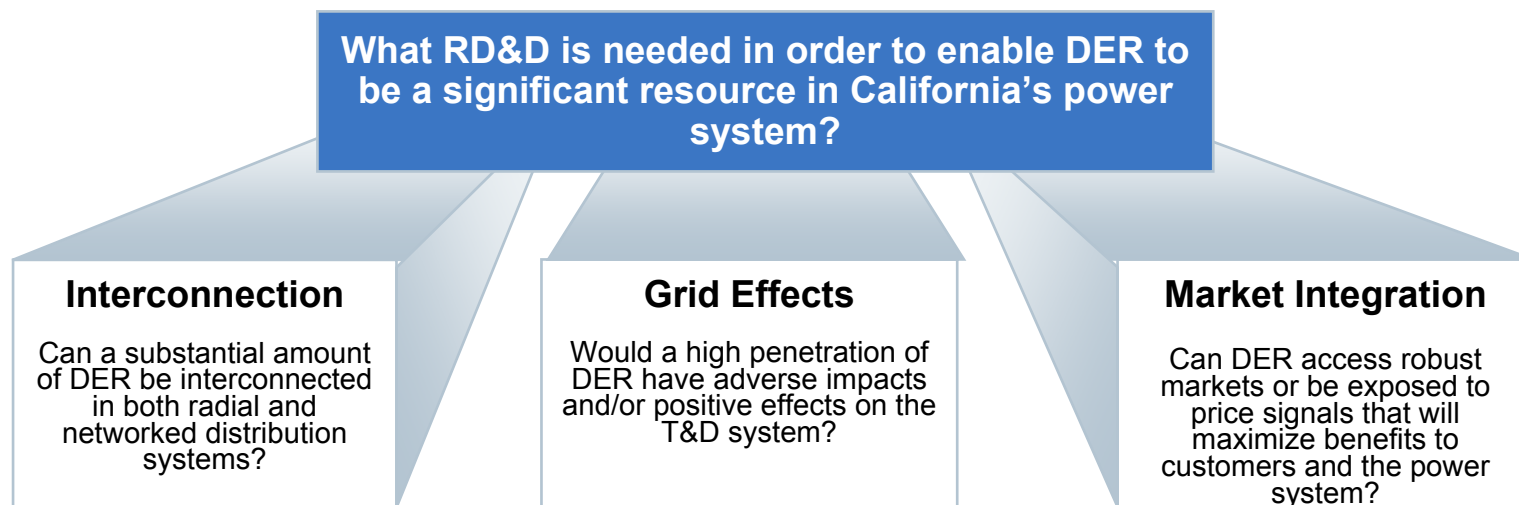






# DER Integration R&D Program

DER Integration focuses on systems research that links technology and policy.



## Benefits of Doing Research

- CPUC adopts interconnection rules as revised
- New research focus on grid and environmental benefits will inform CEC and CPUC policy
- Power system paradigm shifted to decentralized structure creating benefits such as:
  - **More Reliability and Quality** → Greater flexibility and resiliency to disturbances through optimal control and operation of DER and power system
  - **More Efficient and Cheaper** → Reduction of T&D losses, congestion and better use of fuel through CHP
  - **Quicker System Expansion** → Modularity and scalability of DER enables quicker, more flexible increases in system capacity and to address regional specific problems
  - **Improved Environmental Impact** → Economic environmental dispatch strategies



# Current Projects

Initial program priority was interconnection.

New highest priority is understanding grid effects and how that influences interconnection requirements, market design and regulations.

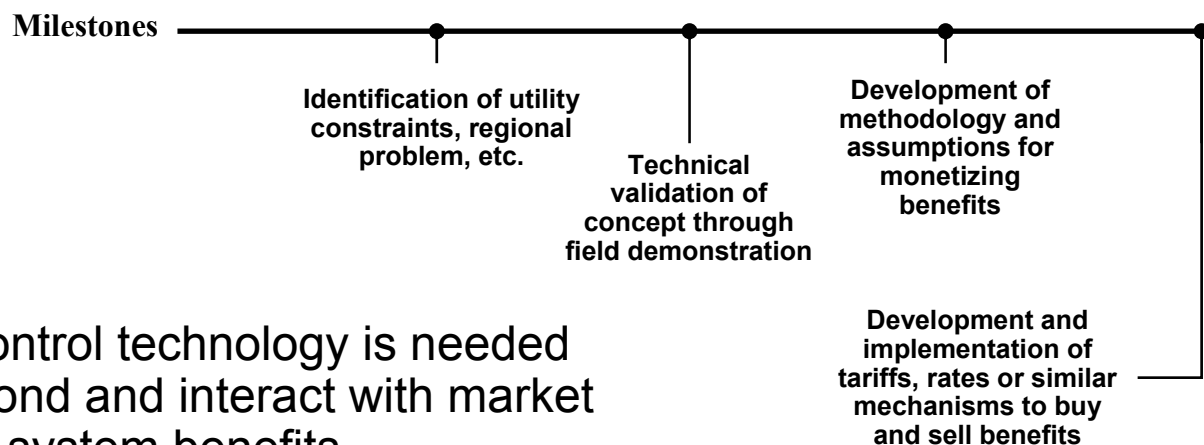
- \* **Consortium for Electric Reliability Technology Solutions (CERTs)**
  - Microgrid Concept Development
  - Standard Power Electronic Interfaces
  - Microgrid Lab Testing Preparation
  - \$1.6M with DOE \$2.8M leverage
- \* **Forging a Consensus on Interconnection Requirements in California (FOCUS)**
  - Rule 21 Technical Support
  - Interconnection Monitoring Program
  - Interconnection Guidebook
  - IEEE 1547/Rule 21 Coordination
  - \$2.21M
- \* **NREL Collaborative**
  - Universal Interconnect Device
  - Innovative Tariffs for DER
  - Modeling Effect of Unbalanced Loading from DG on Voltage Regulation
  - Model Anti-islanding Effects and Interconnection Implications
  - \$1.6M
- \* **Distributed Utility Integration Test (DUIT)**
  - Laboratory demonstration and testing of varying levels of DER in distribution systems
  - \$2.0M with DOE \$2.2M leverage
- \* **Regional Solutions - New Power Technologies**
  - Developing integrated T&D modeling tools to assess locational benefits of real and reactive power insertions into a T&D system
  - \$616k
- \* **Regional Solutions – SF Coop**
  - Validate and quantify through field testing the distribution system benefits of DG, DR, CPP and Efficiency
  - \$595k
- \* **Alternative Energy Systems Consulting**
  - Advanced Communications and Control Technology
  - \$550k



# Grid Effects Related Projects

Projects focus on grid effects, system benefits and market integration.

	Issue	Planning Tool Development	Technical Demonstration and Validation	Monetization of Benefits	Implementation of Market Mechanisms
New Power Technologies	Voltage Stability				
SF Coop	Reliability, Capacity				
DUIT	Voltage Stability & Anti-Islanding				
Interconnection Monitoring	Protection & Power Quality				



Communication and control technology is needed to enable DER to respond and interact with market signals for dispatching system benefits.

# Successful Partnerships



**CEC activities have led to effective partnerships and early successes.**

- **Interconnection rule development has been successful meeting needs of regulators, developers, utilities and consumers**
  - Cost savings to consumers and utilities from simplified process estimated at \$4-16 million over 5 year period ( 2002-2006)
  - Interconnection cost share from industry estimated to be \$2M - \$3M
- **DOE collaboration on microgrids, grid effects testing, interconnection and communication and control**
  - Cost share of \$5M DOE to ESI's \$3.6M
  - Cost savings to consumers unsure until penetration limits and interconnection implications understood through research results
  - Could be substantial if penetration limits found to be higher than current 15% threshold in California interconnection rule

# Environmentally-Preferred Advanced Generation



- **EPAG Mission**

To develop a balanced portfolio and competitive mixture of technologies that will provide value, including efficient utilization of resources, as well as clean, reliable, and high-quality electricity for California.

- **Team Lead: Mike Batham**

(916) 654-4548

[mbatham@energy.state.ca.us](mailto:mbatham@energy.state.ca.us)

- **Renewables Mission**

PIER Renewables research and development activities focus on the development of advanced renewable energy technologies, products and services that will help make California's electricity more diverse, more affordable, more reliable, cleaner, safer and enhances customer choice.

- **Team Lead: George Simons**

(916) 654-4659

[gsimons@energy.state.ca.us](mailto:gsimons@energy.state.ca.us)



# For Up to Date Info, Check Out These Web Sites



## consumer energy center

[www.consumerenergycenter.org](http://www.consumerenergycenter.org)



<http://www.energy.ca.gov/pier/index.html>

[www.energy.ca.gov/distgen](http://www.energy.ca.gov/distgen)